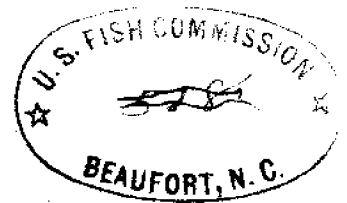


UNITED STATES COMMISSION OF FISH AND FISHERIES
SPENCER F. BAIRD, COMMISSIONER



THE FISHERIES
AND
FISHERY INDUSTRIES
OF THE
UNITED STATES

PREPARED THROUGH THE CO-OPERATION OF THE COMMISSIONER OF FISHERIES
AND THE SUPERINTENDENT OF THE TENTH CENSUS

BY

GEORGE BROWN GOODE
ASSISTANT SECRETARY OF THE SMITHSONIAN INSTITUTION
AND A STAFF OF ASSOCIATES

SECTION III
THE FISHING GROUNDS OF NORTH AMERICA
WITH FORTY-NINE CHARTS
EDITED BY RICHARD RATHBUN

WASHINGTON
GOVERNMENT PRINTING OFFICE
1887

ASSOCIATE AUTHORS.

JOEL A. ALLEN.....	Museum of Comparative Zoology, Cambridge.
TARLETON H. BEAN.....	U. S. National Museum, Washington.
JAMES TEMPLE BROWN.....	U. S. National Museum, Washington.
A. HOWARD CLARK	U. S. National Museum, Washington.
CAPTAIN JOSEPH W. COLLINS.....	Gloucester, Massachusetts.
R. EDWARD EARLL.....	U. S. Fish Commission, Washington.
HENRY W. ELLIOTT	Cleveland, Ohio.
ERNEST INGERSOLL	New Haven, Connecticut.
DAVID S. JORDAN.....	Indiana University, Bloomington, Indiana.
LUDWIG KUMLIEN	Milwaukee, Wisconsin.
MARSHALL MACDONALD.....	U. S. Fish Commission, Washington.
FREDERICK MATHER	N. Y. Fish Commission, Cold Spring, New York.
BARNET PHILLIPS	Brooklyn, New York.
RICHARD RATHBUN.....	U. S. National Museum, Washington.
JOHN A. RYDER.....	U. S. Fish Commission, Washington.
CHARLES W. SMILXY.....	U. S. Fish Commission, Washington.
SILAS STEARNS.....	Pensacola, Florida.
FREDERICK W. TRUE.....	U. S. National Museum, Washington.
WILLIAM A. WILCOX	Boston, Massachusetts.

LETTER OF TRANSMITTAL.

UNITED STATES NATIONAL MUSEUM,

Washington, July 18, 1882.

SIR: I have the honor to transmit herewith, for approval and for publication, Section III of a general work upon THE FISHERIES AND FISHERY INDUSTRIES OF THE UNITED STATES, consisting of a description of the fishing grounds of North America, prepared by Capt. J. W. Collins, Mr. Richard Rathbun, Mr. Silas Stearns, Prof. D. S. Jordan, Dr. T. H. Bean, Mr. F. W. True, and Mr. Ludwig Kumlien. The work is edited by Mr. Richard Rathbun. It is the only report of the kind ever written. It describes the locations, the characteristics, and the productiveness of the numerous grounds resorted to by the fishermen of the United States, extending from Greenland to Mexico, from Lower California to Alaska, and including the fishing grounds of the Great Lakes. The accompanying charts illustrate the fishing grounds and the surface ocean temperatures of the eastern coast of North America.

I have the honor to be, very respectfully, your obedient servant,

G. BROWN GOODE.

Prof. SPENCER F. BAIRD,

United States Commissioner of Fish and Fisheries.

TABLE OF CONTENTS.

INTRODUCTION. By RICHARD RATHBUN	vii
LIST AND EXPLANATION OF CHARTS	xiii
A.—THE SEA FISHING GROUNDS OF THE EASTERN COAST OF NORTH AMERICA FROM GREENLAND TO MEXICO. By JOSEPH W. COLLINS and RICHARD RATHBUN.	
1. Davis Strait	5
2. The Atlantic Coast of Labrador	8
3. The Eastern and Southern Coasts of Newfoundland.....	13
4. The Gulf of Saint Lawrence.....	16
5. The Outer Coasts of Cape Breton and Nova Scotia, including the Bay of Fundy	23
6. The Coast of Maine.....	26
7. The Coasts of New Hampshire and Massachusetts south to Nantucket	39
8. The Gulf of Maine.....	42
9. The Southern Coast of New England.....	46
10. New York to Southern Florida.....	49
11. The Gulf of Mexico, by Silas Stearns.....	55
12. The Offshore Banks, including the Grand Banks.....	61
13. The mackerel and menhaden fishing grounds of the eastern coast of the United States.....	75
B.—THE SEA FISHING GROUNDS OF THE PACIFIC COAST OF THE UNITED STATES FROM THE STRAITS OF FUCA TO LOWER CALIFORNIA. By DAVID S. JORDAN.	
14. The Pacific Coast from the Straits of Fuca to Lower California	79
C.—THE FISHERY RESOURCES AND FISHING GROUNDS OF ALASKA. By TABLETON H. BEAN.	
15. The fishery resources of Alaska	81
16. A review of the Alaskan fishing grounds by districts	86
17. Statistics of the Alaskan fisheries in 1880.....	112
18. Table showing the geographical range of food-fishes in Alaska.....	113
D.—THE FISHING GROUNDS OF THE GREAT LAKES. By LUDWIG KUMLIEN and FREDERICK W. TRUE.	
19. Lake Superior	117
20. Lake Michigan and the Straits of Mackinac.....	119

	Page.
D.—THE FISHING GROUNDS OF THE GREAT LAKES—Continued.	
21. Lake Huron	126
22. Lake Erie	128
23. Lake Ontario	131
E.—THE GEOGRAPHICAL DISTRIBUTION OF FRESH-WATER FOOD-FISHES IN THE SEVERAL HYDROGRAPHIC BASINS OF THE UNITED STATES. By DAVID S. JORDAN.	
24. The Great Lakes	133
25. The Lakes of Maine	134
26. The Connecticut River Basin	134
27. The Hudson River Basin	134
28. The Delaware River Basin	134
29. The Susquehanna River Basin	135
30. The Potomac River Basin	135
31. The Neuse River Basin	135
32. The Santee River Basin	136
33. The Savannah River Basin	136
34. The Saint John's River Basin	136
35. The Chattahoochee River Basin	137
36. The Alabama River Basin	137
37. The Mississippi River Basin	137
a. The Lower Mississippi	137
b. The Upper Mississippi	138
c. The Ohio	139
d. The Missouri	140
38. The Rio Grande Basin	140
39. The Colorado River Basin	141
40. The Sacramento River Basin	141
41. The Columbia River Basin	141
42. The Salt Lake Basin	141
43. Table showing the geographical distribution of the river food-fishes	141
— ALPHABETICAL INDEX	145
APPENDIX :	
Ocean temperatures of the eastern coast of the United States, with thirty-two charts	155

INTRODUCTION.

BY RICHARD RATHBUN.

The term "fishing ground" is commonly applied to any area in which fishing is carried on, whether the fish are taken at the surface or at the bottom, whether near the coast or at a considerable distance from it. The regions traversed by the mackerel and menhaden, in their periodical migrations, during the spring, summer, and fall, are classed as the mackerel and menhaden grounds, and, in the popular mind, belong in the same category with those well-defined elevations and depressions of the sea bottom which are the constant resort of cod and halibut and other bottom-feeding species. We also speak of the fishing grounds for herring, lobsters, shrimps, oysters, and sponges, although these species are taken mostly near the shores, while the cod and halibut grounds are sometimes distant from them several hundred miles.

The main purpose in preparing this section of the Fisheries Report has been to describe that class of North American fishing grounds to which the term more properly belongs, or those areas of the sea bottom which are known to be the feeding or spawning grounds of one or more species of edible fishes, and which afford fisheries of greater or less extent. The most important grounds of this character are located off the eastern coast of North America, between Nantucket and Labrador, this region furnishing by far the most important cod and halibut fisheries of the world, and including the large and well-known offshore banks, extending from George's, at the southwest, to the Flemish Cap, off the eastern coast of Newfoundland. These banks form an almost continuous series of broad, submarine elevations, stretching a distance of 1,100 geographical miles, and with a varying width of 50 to 250 miles. They attracted the attention of early navigators, and in the period of the first-attempted settlements on the adjacent shores of North America, now included in the British coast Provinces, were regarded as one of the greatest sources of wealth then known to the world. The principal maritime nations of Europe soon became interested in developing the newly-discovered fisheries, France apparently taking the most active part, and every year large fleets of vessels were sent to fish upon the banks. Colonies were established in connection with the enterprise, and the influence of the Great Banks upon the early settlement of some portions of our northeastern coast has probably never been estimated at its true value by historians.

It is now nearly four hundred years since these grounds were first fished upon by Europeans, and their resources are still unfailling; but the fishing interests have been mainly transferred to the New World, France alone of European countries having continued to send fishing vessels across the Atlantic down to 1880. Since then, however, the Portuguese have begun to exhibit some activity in connection with the cod fishery of the Grand Bank, and in the spring and summer of 1885 bought several New England fishing schooners and fitted out others from home ports. Their voyages proving generally successful, they have added more vessels to their fishing fleet during the latter part of this year, and it is quite possible that, in the course of a few seasons, they will have firmly re-established themselves in the fisheries of the Western Atlantic. The

French fishermen visit principally the Grand Bank, Saint Pierre, Banquereau, and certain portions of the coast of Newfoundland, on which they have long possessed the right to fish by treaty with Great Britain. Much English capital is invested in the Provincial fisheries, and vessels of other nations than the French and Portuguese come to this country to load with fish for foreign markets, but few, if any, ever engage in fishing.

The great offshore banks are now chiefly resorted to by the fishermen of New England and the British maritime Provinces, the latter including Nova Scotia, New Brunswick, Prince Edward's Island, Lower Canada, and Newfoundland, but the Provincial fishermen seldom venture as far south as George's Bank, which is frequented mostly by Gloucester vessels, and a few halibut catchers from Southern New England.

The most distant grounds visited by the fishermen of the United States, at the time this report was prepared, are located in Davis Strait, in the vicinity of Holsteinborg, on the west coast of Greenland, about 67° north latitude. They consist mainly of rocky banks, with patches of sand and mud, the depths of water ranging from 20 to 50 fathoms, and abound in halibut, but cod are scarce, and are taken only in small quantities. In 1884, acting upon information furnished by the United States Fish Commission, three Gloucester vessels made excellent halibut trips to the fishing banks of Iceland, and in the summer of 1885 four vessels from the same port obtained full fares on the Iceland grounds. Fishing is reported to be more profitable than in Davis Strait, and this region will probably prove very attractive in the future. Very few United States vessels now go either to the coasts of Labrador or Newfoundland, or to the Gulf of Saint Lawrence. No fares of halibut have been taken in those regions since 1881, and during the six years preceding that date the amount obtained was very small. About 12 or 15 cod fishermen still resort to the Gulf of Saint Lawrence every summer, but the mackerel fishery has been mostly transferred to the open waters on our own coast. The mackerel fleet in the Gulf of Saint Lawrence from United States ports has, during the past 8 or 10 years, seldom numbered more than 40 or 50 vessels, and during the same period the catch in those waters has probably not exceeded 3 per cent. of the total catch of the United States fleet.

The fishing grounds indicated on the charts representing the Gulf of Maine, and the coast-lines of Maine, New Hampshire, and Massachusetts, are mostly small banks, ledges, and shoals, with rocky, stony, gravelly, and sandy bottoms, separated by tracts of mud and sand. Upon the elevations, cod, haddock, pollock, and cusk abound, while the muddy areas between constitute the best known localities for the capture of hake. Although individually of relatively small size, compared with the offshore banks, these grounds form in the aggregate a very extensive and valuable fishing region, of much importance to the smaller class of fishing vessels and the boat-fishermen. From Nantucket westward and southward, to the Gulf of Mexico, the fishing grounds of the same class are much less numerous than at the north, more widely separated, and often entirely wanting over long distances; they are also generally less defined, especially as regards differences in the depth of water, and bottom fishing is not carried on to nearly as great an extent.

At the southern extremity of Florida good bottom fishing is obtained on the edge of the Gulf Stream, and among the coral reefs, by the Key West market fleet. In the Gulf of Mexico there is a broad belt of fishing ground, following the general contour of the coast and extending from the Tortugas Keys nearly to the mouth of the Mississippi River. It has a greatly diversified bottom, consisting in some places of ledges, in others of sandy, shelly, muddy, and rocky bottoms, traversed by gullies, and living corals are said to be abundant on many portions. Fishing is conducted in depths of 5 to 40 fathoms, the principal species taken being the red and black groupers and the red snapper.

On the Pacific coast the sea fisheries have as yet been but little developed, and such as exist are mainly carried on along shore. No attempts are made to discover offshore grounds, probably because of the scarcity of markets for the sale of fish. The principal fisheries between the Straits of Fuca and Lower California are in the neighborhood of San Francisco, but the grounds resorted to do not extend seaward beyond the Farallone Islands. In Alaskan waters sea fishing is pursued mostly by the natives, but rich cod and halibut grounds exist in that region.

Of special sea fisheries, the mackerel, menhaden, and sponging grounds have been briefly treated, and accounts of the fishing grounds of the Great Lakes have also been admitted into this section. The mackerel and menhaden grounds furnish ocean fisheries of great magnitude, in the same general region in which are located many of the more important inshore fishing banks and ledges of the northeastern coast of the United States, and are frequented by large fleets of vessels built and equipped expressly for the purpose. The lake grounds are all situated comparatively near shore, but often extend into considerable depths of water; they are seldom characterized by any peculiarities in the nature of the bottom, but are generally favorable localities for the setting of nets, or passage-ways used by the fish in moving from place to place. The principal kinds of fish taken are the lake-trout and whitefish, the appliances used being chiefly pound-nets, gill-nets, and seines. In some places, as at the Sault de Ste. Marie, dip-nets are employed from canoes in the capture of whitefish, and some hook-and-line fishing is also done.

In locating and defining the various fishing grounds, the writers have resorted both to brief descriptive accounts and to sketch maps or charts, the latter being employed only where the grounds are sufficiently well known to permit of their being plotted with at least approximate accuracy. This has been possible for almost the entire eastern coast of North America, but that region alone has been thus graphically represented.

The information upon which the report is based was derived from many sources. The fishing grounds of Davis Strait were visited in 1879 by Mr. N. P. Scudder, then an assistant on the United States Fish Commission; and he has prepared a full account of his trip, from which we extract that portion bearing upon the cod and halibut banks, adding a few notes made by other observers. The map of the same region was also furnished by Mr. Scudder. As to the inshore grounds of the British coast Provinces and the grounds of the Gulf of Saint Lawrence, we have relied in part on Canadian fishery reports, in part on accounts received from United States fishermen, who have repeatedly visited that region.

The outlines and principal contours of the offshore banks, from the Flemish Cap to, and including, Brown's Bank, have been taken mainly from the British Admiralty charts, and those of George's Bank from the charts of the United States Coast Survey. The data respecting the characteristics of those banks, their productiveness and their history, were almost entirely brought together by Capt. Joseph W. Collins, whose personal experiences for many years in the fisheries of every part of that extensive region entitle his statements and opinions to our fullest confidence. The same author is also to be credited with obtaining most of the information concerning the fishing grounds of the Gulf of Maine and the New England coast north of Cape Cod, many of these grounds having likewise come within his personal observation. The account for Southern New England, New York, and New Jersey was prepared from information procured by Mr. R. Rathbun directly from reliable authorities, and that for the Southern Atlantic coast mainly from the observations of Mr. R. E. Earll. The report upon the fishing grounds of the Gulf of Mexico was furnished complete by Mr. Silas Stearns, of Pensacola, Fla., one of the best informed authorities on the sea fisheries of our southern coast. Prof. D. S. Jordan, who reports upon the western coast of the United States, and Messrs. Kumlien and True, who prepared the account for the Great Lakes,

based their descriptions on observations made while investigating the fisheries of those regions, on behalf of the fishery census of 1880. Dr. T. H. Bean's report upon Alaskan resources and fishing grounds is the result of studies made upon numerous collections of fishes received from that Territory, from time to time, during many years, supplemented by personal observations in the field during a trip to Alaska in 1880.

With respect to the fishing grounds of Eastern North America, a few additional words of explanation are necessary. The outlines of a fishing ground seldom conform to the contour lines used on hydrographic charts to define the limits of a bank, ledge, or other inequality of the sea bottom, as the fishes are not always influenced so much by differences in the depth of water (within certain limits) as by the abundance of food or other essential conditions, among which temperature probably enters as an important factor. A fishing ground may, on one side, have a less depth than 25 or 30 fathoms, and on the other descend to depths of 50, 60, or even, in some cases, several hundred fathoms, the same species of fish sometimes occurring at both extremes. Many of the data furnished by the ordinary class of hydrographic work are, therefore, entirely unsuited to fishery purposes, and it is of the greatest importance that special surveys be undertaken in the immediate interest of the fisheries, and with the object of ascertaining the full extent and character of all the larger grounds that may be profitably resorted to by our fishermen. Fishing grounds are constantly changing in productiveness, and any survey bearing upon them should be made continuous, in order that the changes may be noted and their causes explained, if possible.

Such a work as this belongs within the province of the now existing United States Commission of Fish and Fisheries, and so far as the means at its disposal have permitted, its researches in this particular have been carried on with thoroughness and precision. Until within a very few years, however, this Commission was provided only with small vessels, with which it was impossible to extend the explorations much beyond those areas commonly entitled the inshore grounds, or beyond the boundaries of the United States. In 1883, the Commission was, for the first time, supplied with a thoroughly reliable sea-going steamer, capable of visiting any part of the oceanic grounds, and it has already collected many important data bearing upon the great banks of the northeastern coast, the mackerel and menhaden grounds, and the fishing areas of the Gulf of Mexico. New fishing grounds of great value have already been discovered, and new species of edible fishes have been introduced to the markets; but this work, so far as the steamer *Albatross* is concerned, has only just begun, and in the near future may be expected to add greatly to our knowledge of the fishery resources of our country. The series of investigations by the *Albatross* being entirely subsequent to the preparation of this volume, no account of it will be found on the following pages.

The above remarks will serve to indicate how difficult it is to locate, and especially to plot with distinct outlines, many of the fishing grounds along our coast, particularly as very few of the inshore grounds are in any way indicated on the Coast Survey charts. For those that have been previously marked out, as in the case of defined banks and ledges, we have relied in part on published charts, in part on information furnished by fishermen, by means of which latter it has often been possible to greatly perfect the outlines. The work of plotting nearly all the inshore grounds has been first attempted in connection with this volume, the data having been mostly obtained directly from the fishermen who are constantly resorting to them, and some of whom have drawn the outlines themselves. Every precaution has been taken to procure such information only from reliable persons, and to verify the same by other means wherever possible; and although it is not expected that absolute accuracy has been reached in all cases, especially as regards distances, the fishermen having to rely mainly on their judgment in this matter, it is probable that the positions

and outlines assigned to the grounds are, in the main, correct. In resorting to offshore grounds, the fishermen make use of a patent log for determining distances, and also ascertain their positions by observations for latitude and longitude, and their statements respecting localities at a distance from shore are as reliable as could be obtained from any source.

The limited time available for the preparation of the account of the fishing grounds of Eastern North America prevented the incorporation of materials bearing upon their temperature, currents, and general natural history characteristics—subjects that cannot be ignored in the study of the fishery resources of any region. Many data of this character have been obtained by the United States Fish Commission, and, although some of them have been already published in brief reports, the greater portion are still in process of elaboration, and will be issued at a future date in such form as to conveniently supplement this report.

The text composing this section was finished and sent to the printer in 1882. Delays in printing and in the preparation and engraving of the charts have enabled the writers, in connection with the latter, to add much information obtained since 1880, especially respecting the cod and halibut fisheries of the large offshore banks. This new material is contributed by Captain Collins, and is the result of studies continued through many years, and based mainly upon his own observations and those of the Gloucester fishermen directly concerned in the facts recorded. It brings the history of the more important cod and halibut fisheries down to the spring of 1885, and notes the principal changes that have taken place in recent years in the character and richness of the different parts of the offshore banks.

The charts have been drawn by Mr. C. E. Gorham, assistant on the United States Fish Commission, and engraved by the Photo-Engraving Company of New York. All distances recorded with respect to the eastern coast of North America are in nautical miles.

WASHINGTON, *December 30, 1885.*

[NOTE.—Since this introduction was put in type it has been found possible to add to this report a brief discussion of the surface ocean temperatures along the Atlantic coast, with a series of thirty-two graphic charts, which are given at the end of this section.]

LIST AND EXPLANATION OF THE CHARTS REPRESENTING THE SEA FISHING GROUNDS OF THE EASTERN COAST OF NORTH AMERICA.

1. LIST OF CHARTS.

	Page.*
CHART No. 1.—The Fishing Grounds of Davis Straits.....	5
CHART No. 2.—The Flemish Cap.....	61
CHART No. 3.—The Banks of Newfoundland	62
CHART No. 4.—The Banks off the coast of Nova Scotia	67
CHART No. 5.—The Fishing Grounds of the Gulf of Saint Lawrence	16
CHART No. 6.—Fishing Grounds in the vicinity of Eastport, Maine.....	24
CHART No. 7.—Fishing Grounds from Nova Scotia to Penobscot Bay, Maine	26
CHART No. 8.—Fishing Grounds from Penobscot Bay, Maine, to Cape Ann, Massachusetts	30
CHART No. 9.—Fishing Grounds near Monhegan Island, Maine	33
CHART No. 10.—Fishing Grounds from Cape Ann to Buzzard's Bay, Massachusetts	39, 45
CHART No. 11.—George's Bank.....	74
CHART No. 12.—Fishing Grounds from Gay Head, Massachusetts, to Cape Henlopen, Delaware.....	47
CHART No. 13.—Fishing Grounds from Cape May, New Jersey, to Cape Hatteras, North Carolina.....	51
CHART No. 14.—Fishing Grounds from Cape Hatteras, North Carolina, to Cape Romain, South Carolina.....	52
CHART No. 15.—Fishing Grounds from Cape Romain, South Carolina, to Saint Augustine, Florida	53
CHART No. 16.—Fishing Grounds of the Gulf Coast of the United States. Prepared by Mr. Silas Stearns.....	55
CHART No. 17.—Sponging Grounds of the Coast of Florida. Prepared by Mr. Silas Stearns.....	58

2. EXPLANATIONS OF CHARTS 3, 4, AND 5.

The following notes are based on data mainly obtained previous to 1880, but, unfortunately, not available at that time for insertion in the body of the text, to which they now serve as an appendix. They have reference, for the most part, to the extensive halibut and cod fisheries of the important banks lying off the coasts of the British maritime Provinces, and are intended more especially to call attention to certain localities in which good fishing had been obtained down to the close of 1879, or the early part of 1880, the year in which the investigations respecting them were mostly made. A few facts of more recent date have also been added. The years in which good fares were obtained are generally mentioned, and these explanations, in connection with the charts to which they relate, furnish, therefore, important data of historical interest, as well as regarding the relative value of different parts of the several fishing grounds in past years.

Changes are constantly taking place in the abundance of fish on all the large fishing banks. In many instances these changes are of only a temporary nature, and if fish are scarce one year, they may be abundant again the next. The halibut apparently furnish an exception to this rule, and good grounds, once depleted, have seldom been known to regain their former status. A few instances are, however, on record, where old and seemingly worn-out grounds have again afforded a good halibut fishery, but such cases are said to be rare, and the facts are regarded as favoring

* Refer to the pages of the text where the grounds are described.

the presumption that schools of halibut which have been thinned out and scattered by incessant fishing require at least many years to recover their former size, or even to show a perceptible increase. The history of the halibut fishery of the Great Banks covers a comparatively short period, and future observations may correct some of the prevailing opinions respecting that fishery. These remarks do not apply to the regular migrations of the halibut, which have been elsewhere discussed.

Fewer references are made to the localities of cod than to those of halibut fishing, and the former relate mainly to certain areas on the Grand Bank which are deserving of special notice. They also furnish an idea of the principal localities where fishing is carried on in the different seasons, and the character of the bait used in different places.

Special localities are designated by Roman numerals to facilitate reference. All of the fishing schooners mentioned by name belonged to ports in the United States and most of them hailed from Gloucester, Mass.

CHART NO. 3.—THE BANKS OF NEWFOUNDLAND.

Bank of Saint Pierre.—Cod and halibut, although once abundant on this bank, were scarce during the few years immediately preceding 1880, and during that period not a single fare of halibut was taken in depths of less than 70 to 100 fathoms, and no good cod fishing was obtained there by American vessels. Since 1880, however, cod have apparently returned to Saint Pierre in as great abundance as ever, and we understand that several vessels from New England secured good fares there in a short time, during 1883 and 1884. Halibut were still scarce up to the last-mentioned date. From 1865 to 1872 this bank was much resorted to for halibut. The spots inclosed by the dotted lines marked I on this chart, and XIV on the chart of the Gulf of Saint Lawrence, were formerly good halibut grounds, but these are not the only localities where this species was taken on the bank.

I. The space inclosed by the dotted line is the so-called "Southern Shoal Water" of the Bank of Saint Pierre, and was formerly the most important halibut ground on the bank.

II. In this position, in a depth of 140 to 170 fathoms, halibut were abundant in 1878, and from May to September of that year the schooner *Gwendolen* took four or five good fares on a small area of hard bottom, surrounded by mud. Halibut have occasionally been taken since then, but are less common than when the place was first discovered.

Green Bank.—The gullies separating Green Bank from Saint Pierre and the Grand Bank, and the extensive deep plateau that extends from Saint Pierre to the Grand Bank, along the southern border of Green Bank, constitute together one of the most important halibut grounds that has been recently discovered. In their spring migrations, the halibut follow nearly along the course indicated by the dotted line running along the edge of the Grand Bank to the Bank of Saint Pierre. Since the deep-water halibut fishery was begun, in 1875, halibut have been abundant along the edge of the slope south of Green Bank, and have generally been most numerous from February to May. In some years they have been plentiful all summer and even in the fall. In the fall of 1882 one or more good fares of cod were obtained just south of this bank, in 65 fathoms of water.

III. The schooner *Nathaniel Webster* caught a fare of 80,000 pounds of halibut in this position, in March, 1879, and many other large fares have been taken in the same locality.

IV. Excellent fishing ground for halibut, in depths of 90 to 140 fathoms, from May to October, 1875. In April, 1876, halibut were again very abundant in 80 to 90 fathoms, and were noticed to be moving slowly westward along the edge of the ground. In the position marked, the schooner *Howard* took a fare of 95,000 pounds of halibut in a few days, and eight or ten other vessels obtained fares at the same time, ranging from 75,000 to 115,000 pounds each. Halibut were found here again, March 25, 1877, March 15, 1878, and February, 1879. In the years succeeding 1875, halibut, though abundant in the late winter and spring, were generally scarce in the summer and fall. In 1882, however, they were exceedingly plentiful during the entire summer and a part of the fall.

V. Halibut abundant in October, 1875.

VI. Large catches of halibut made in April, 1877.

The Grand Bank or Great Bank of Newfoundland.—VII. Good halibut fishing found by the schooner *Ocean Belle* at this place, in 52 fathoms, in April, 1877.

VIII. First fishing for fresh halibut on the Grand Banks in upwards of 100 fathoms at this place, in April, 1875. The fish were very abundant in depths of 100 to 160 fathoms.

IX. Very good halibut fishing, February, 1879.

X. The schooner *G. G. Kidder* found halibut abundant here in the spring of 1874 in 90 fathoms, and obtained the first fare of fresh halibut taken in deep water on the Grand Banks.

XI. The area inclosed by the dotted line afforded excellent halibut fishing during several years, the season lasting from February until May. Since 1877 the fish have been scarce here.

XII. In March, 1877, the schooner Howard caught 25,000 pounds of halibut at this place in one day, in 55 fathoms.

XIII. Good halibut fishing, January and February, 1879.

XIV. Halibut very abundant March, 1876, and many good fares obtained. In May, 1879, the schooner Mary F. Chisholm secured a fare of 40,000 pounds.

XV. In the inclosed area many large fares of halibut were caught in February and March, 1866 and 1867. At the spot marked with the cross the schooner Centennial obtained 100,000 pounds in one trip.

XVI. The crosses indicate the position of the halibut fleet in January, 1878, where good fares were obtained in depths of 160 to 200 fathoms. Halibut were scarce here in 1879.

XVII. Halibut were very abundant in the positions indicated by the crosses in the springs of 1876 and 1877, and fine fares were obtained in 150 to 300 fathoms. The edge of the Grand Bank on this side, from its southern end to 44° north latitude, has been one of the best halibut grounds in the Western Atlantic ever since the discovery of the deep-water fishery, and many large fares have been taken at all seasons. The halibut are, however, somewhat erratic in their movements, and are not equally abundant at all times. Those found to the southward of latitude 44° north appear to be moving off from the bank into water too deep for the fishermen to follow them, and all trace of them is lost. North of latitude 44° north they seem to be working along the edge of the bank, and often it is not difficult to trace their summer migrations in the early part of the season.

XVIII. In this position the schooner Stirling, on a "salt trip," made a large catch of halibut in 130 fathoms in April, 1873. This is the first recorded instance of deep-water halibut fishing on the Grand Banks.

XIX. The area inclosed by the dotted line was a favorite halibut ground in the winter and spring for several years previous to the beginning of the deep-water fishery. The schools of halibut were generally migrating towards the west and northwest. This area also furnishes excellent cod-fishing, and is much resorted to by fishermen from the United States, the British Provinces, and France. In the space inclosed at its southern end, and marked "Good Cod Grounds"—cod were very abundant in June, 1877. Good cod-fishing is still found here almost every summer, but halibut are no longer taken in any considerable numbers.

XX. In the position indicated by the cross many fine fares of halibut were caught prior to 1875. This locality is noted for the exceedingly large fare obtained by the schooner Mary Carlisle, in April, 1871, which paid the crew shares of \$236 each, the largest ever realized from a fresh halibut trip.

XXI. Halibut abundant in January, 1876.

XXII. This ground, known as the "Eastern Shoal Water," was chiefly resorted to for halibut from 1864 to 1871. After 1869, however, but few halibut were caught here except in the fall. Good fall trips were made as late as 1874. The dotted cross in the western part of the inclosed area indicates where the schooner Mary G. Dennis took a large fare in the spring of 1868, and that in the southeastern part where the schooner N. H. Phillips, in October, 1871, obtained a fare that realized one of the largest stocks ever made on a fresh halibut trip up to that date. Up to within a few years of 1880, the Eastern Shoal Water was also a favorite place for cod in the fall, and sometimes at other seasons. Of late it has not been as much resorted to as formerly. It was on this ground that the "giant squid" were found in such large numbers in the fall of 1875.

XXIII. Halibut were abundant along this edge of the bank in 1881 and 1882, between 43° 30' and 44° 15' north latitude, and in depths of 125 to 300 fathoms. The prevalence of icebergs and the strength of the Arctic current render fishing here very difficult and dangerous.

XXIX. Halibut were abundant on and near the Virgin Rocks during the summers from 1868 to 1870, inclusive, and several large fares were obtained. Since 1871 no catches of importance have been made. The Virgin Rocks have been for many years a favorite locality for hand-line dory fishermen engaged in the cod fishery, and in the summer a fleet of vessels lies near the shoals, each one sending out from 10 to 25 dories. The cod average somewhat smaller than on other parts of the Grand Banks, being such as are called "mixed fish" in New England.

XXX. Good cod fishing obtained on trawls with salt clam bait and "shack," April, 1879.

XXXI. Good catches of cod made with capelin bait in June and July, 1877 and 1878.

XXXII. Cod fishing with shack bait good in June and July, 1874 and 1878.

XXXIII. This ground nearly always affords good cod fishing from May to July, with herring, capelin, and squid bait. The fish were very abundant in June, 1879.

XXXIV. Cod very abundant in June, 1875.

XXXV. Good cod fishing with herring bait, May, 1879.

XXXVI. Good catches of cod with squid bait were made in August, 1879.

XXXVII. Good cod fishing with squid bait, July, 1879.

SEC III—II

XXXVIII, XXXIX. Good cod fishing with capelin bait, June, 1879.

XL. Good cod fishing with squid bait in August and September, 1879. The inclosed area north of this ground furnished an abundance of cod in July, 1878, when squid bait was used.

Barren ground.—Good fares of cod have been occasionally reported from this area, but we have not been able to obtain any reliable information respecting them.

CHART NO. 4.—THE FISHING BANKS OFF THE COAST OF NOVA SCOTIA.

Seal Island Ground.—This ground is now chiefly valued for the cod fishery which it affords from the first of May to October of each year. It is mostly resorted to by a large fleet of vessels hailing from ports in the vicinity of Cape Sable, Nova Scotia, and commonly called the "Cape Fishermen." These vessels spend most of the season fishing on this ground. A few United States vessels, fishing with hand-lines, frequently resort to it, and it was formerly a favorite locality for halibut, but is not at present.

I. Halibut were found in abundance at this place for a few days in June, 1878.

II. In this position, off the northwestern part of George's Bank, in depths of 110 to 160 fathoms, many good fares of halibut were obtained by hand-line fishermen in 1876 and 1877.

III. The schooner Alice G. Wonsen made good fares of halibut in this vicinity, in depths of 160 to 200 fathoms, during several successive years preceding 1880. The prevalence of strong tides and the frequent parting and loss of trawl-lines by their becoming entangled in the large tree corals, *Paragorgia arboria* and *Primnoa reseda*, which are numerous on the bottom, have deterred others from fishing here, and no satisfactory results have been obtained by other vessels.

IV. In the fall of 1877, halibut were abundant along the region indicated by this dotted line, to the westward of Le Have Bank, but since then they have been scarce. The crosses at the eastern end of the line indicate positions where large fares of halibut were obtained from 1877 to 1879. At the easternmost position, the schooner Julia Wood caught 80,000 pounds of halibut in December, 1877. The depths fished in vary from 100 to 400 fathoms.

Sable Island Bank.—The Pot Ground, also called the "Tongue Ground," from its fancied resemblance to a tongue, is frequently an excellent locality for cod fishing in April and May. Since 1880, good fares of cod have been caught in depths of 60 to 90 fathoms on the edge of the bank, SE. by S. to ESE. from the eastern light of Sable Island. From 1852 to 1873 certain localities on Sable Island Bank, in depths of 30 to 60 fathoms, were much resorted to by the halibut fishermen, and since the discovery of the deep-water fisheries, in 1875-'76, many excellent fares have been obtained on the "fall off" of the bank along its southern and eastern edges.

V. This locality, on the eastern part of Sable Island Bank, was a favorite winter halibut ground from 1852 to 1873. It was fished on in the winter as late as 1877, but good fares have seldom, if ever, been taken since 1873.

VI. Several good fares of halibut taken between 1853 and 1868.

VII. Good halibut ground in 1852.

VIII. Good fares of halibut obtained between 1853 and 1873.

IX. Good halibut fishing at intervals from 1853 to 1870. The schooner William T. Merchant obtained a large fare here in February, 1868.

X. One fare of halibut has been taken on this steep incline, which slopes rapidly from 150 to 400 fathoms.

XI. The cross indicates a locality where many excellent fares of halibut were taken from 1877 to 1879, inclusive, in depths of 150 to 300 fathoms.

XII. One of the best deep-water halibut grounds on Sable Island Bank. Many good fares have been obtained; the bottom is covered with bush and tree corals.

XIII. The schooner Howard caught 45,000 pounds of halibut at this place in eight days, in August, 1877.

XIV. Good fares of halibut taken in 60 fathoms, in 1853.

XV. In this position, in July, 1877, the schooner William Thompson obtained a fare of 100,000 pounds of halibut, and the schooner Howard, fishing only six days, a fare of 82,000 pounds, in depths of 125 to 200 fathoms. Many other good fares have been taken in this vicinity at different seasons, and the edge of the bank, over a distance of more than 60 miles, was a favorite locality for halibut up to the close of 1879.

XVI. Position where the type specimen of the gold-banded bush coral, *Ceratois ornata*, was taken in 1878. This is one of the most rare and beautiful of the several species of corals obtained on the fishing grounds by the Gloucester fishing schooners.

XVII. Good fares of halibut obtained by the schooner Gertie E. Foster, in 1875-'76.

XVIII. Good fares of halibut taken in depths of 40 to 50 fathoms, from 1853 to 1855, inclusive.

XIX. The Gully is a celebrated halibut region. It extends from $58^{\circ} 58'$ to $59^{\circ} 57'$ west longitude, and from $44^{\circ} 04'$ to $44^{\circ} 27'$ north latitude. In its southern part, between $44^{\circ} 04'$ and $44^{\circ} 10'$ north latitude, there is located a small but important bank, described below. The crosses in the western part of the Gully, numbered XIX, indicate localities where halibut were found in abundance from 1874 to 1876, inclusive. The other crosses all refer to large catches of halibut made from 1877 to 1879, inclusive. In the three years last mentioned, enormous quantities of halibut were taken from this region, and to such an extent were its resources exhausted thereby that in the three or four years immediately following 1879 halibut were exceedingly scarce in the Gully, and during some seasons the fishing was quite unprofitable. In 1884-1885, however, a few good fares were obtained. The small bank in the southern part of the Gully, above mentioned, is separated from Banquereau and Sable Island Bank by narrow gullies, about 150 fathoms deep, the average depth of water upon the bank itself being about 100 fathoms, and the bottom consisting of coarse pebbles, gravel, and stones. Toward the northward the water deepens to 150 fathoms, and toward the south the bottom rapidly falls off to depths of 500 or 600 fathoms. Fishing was carried on in the Gully some years before the bank was discovered, and as it had never been surveyed or plotted on the charts, the fishermen supposed its position was occupied by deep water. It was probably first noticed about 1877, and during a few subsequent years exceedingly good halibut fishing was obtained along its southern edge; but the fish are much less abundant now than they were in the beginning.

Banquereau.—The cod obtained on this bank are, as a rule, small, and it is not as much resorted to now as formerly by fishermen from the United States. A limited number of hand-line dory fishermen and a few trawlers comprise the American fleet of cod fishermen. French vessels, using trawls, fish extensively on the bank north of $44^{\circ} 30'$ north latitude, but are seldom seen farther south. This bank is celebrated for its valuable halibut fisheries, which occur in the deeper water along the edges. The most noted of these are the "Southwest Prong" and the deep plateau off the eastern end.

XX. The first deep-water halibut caught on the Southwest Prong were taken in this position in 1876. The other crosses indicate where large catches were made from 1876 to 1879, inclusive.

XXI. Nearly 500,000 pounds of halibut were taken in this position, on a spot not more than one mile square, in the summer of 1879.

XXII. This locality, called the "Stone Fence" by the fishermen, is noted for the great abundance of corals growing on the bottom. On the Stone Fence and immediately to the north of it, many large fares of halibut have been caught in depths of 150 to 230 fathoms. This locality has shown less signs of becoming depleted than any other lying to the west of it.

XXIII. Halibut were abundant at this place in April, 1879, and several good fares were obtained.

Misaine Bank.—Scarcely anything has been known respecting the fisheries of this bank, and it has generally been regarded by the fishermen as comparatively barren ground. In the summer of 1885, the U. S. Fish Commission steamer Albatross, while engaged in explorations in this region, made a series of trials with hand-lines across the bank from its eastern to its western edge, and found cod fully as abundant as on any of the adjacent fishing grounds, and of as large size and good quality as are taken on Banquereau.

CHART NO. 5.—THE FISHING GROUNDS OF THE GULF OF SAINT LAWRENCE.

I. The first halibut taken on the coast of Anticosti Island were caught in this vicinity in 1869.

II. On this coast, between 61° and 62° west longitude, halibut were sometimes moderately abundant, close in shore, in the summer season prior to 1875. Since then no important catches have been made.

III. In the immediate vicinity of Red Island the fishing schooner Ocean Belle made a fare of 80,000 pounds of halibut in the summer of 1870. As explained in the text, however, this region is controlled by the French, and is not now resorted to by United States vessels.

IV. Moderately large fares of halibut were obtained at the Bay of Islands by American vessels in 1872 and 1874, but nothing of importance has been done since then.

V. The first catch of halibut at Green Point was made in June, 1871, by the schooner William T. Merchant, and in June and July of 1878 and 1879 several very large fares were obtained at the same place.

VI. A few small fares of halibut were obtained in the summer season about Bryon Island and on the shoal between the island and Bird Rocks. This region, however, has never been an important one for any of the Gulf fisheries.

VII. The area inclosed in the dotted line is the so-called "Flint Island Halibut Ground," on which fares of halibut were obtained from 1861 to 1875, especially during the months of May and June. Since the latter date, however, this ground has been practically abandoned by the halibut fishermen.

VIII. In 1861 the schooner Centre Point obtained a fare of 60,000 pounds of halibut in the narrow strait between Scatari Island and Cape Breton. This is supposed to be the first fare of halibut taken in this vicinity.

IX. In this locality the schooner Carl Schurz secured a fare of 90,000 pounds of halibut in April and May, 1879. Many other good fares have been taken in the same place, and also a short distance to the northwestward, in the winter and spring.

X. A fare of halibut was taken at this place by the schooner Centennial in May, 1878.

XI. A fare of 100,000 pounds of halibut by the schooner M. H. Perkins in May, 1879.

XII. Miquelon Beach halibut grounds. Halibut were very abundant here in the summer from 1868 to 1870, but have been scarce since then.

XIII. Pass Island halibut grounds. Fish were very abundant for two or three seasons, from 1870 to 1872, over an area not exceeding three miles across, and with a depth of about 160 fathoms. Many good fares were obtained, but the fish have been scarce since 1872.

XIV. Between 1865 and 1870 many halibut were caught on the northern part of Bank St. Pierre, within and near the dotted line.